INDUSTRIAL AND CIVILIAN CONSUMPTION OF PETROLEUM PRODUCTS IN CONTINENTAL EUROPE IN 1938

Description

A study of the consumption of liquid petroleum products in 1938 in Continental Europe, excluding those countries which remained neutral

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I. INTRODUCTION

The following discussion presents estimates of the consumption of liquid petroleum products by uses in Continental Europe, excluding those countries which remained neutral during the war.

Almost no official statistics have been published on this subject. Some semi-official and trade statistics were available covering consumption by products, but in no case did the material cover consumption by uses. The estimates of requirements by products have, therefore, practically all been based on trade statistics, domestic production figures, and such compilations as have been published by the oil companies operating in the countries in question.

Once the consumption by products for each country had been established, it was necessary to break down the figures into requirements for each major use. The following categories were considered in each case:

Road transportation
Railways
Shipping
Aviation
Agriculture
Industry
Household

Wherever feasible, the number of oil-using machines and pieces of equipment in each of these categories was calculated and the average quantities of oil consumed by each unit of equipment estimated. It was then possible to estimate the total quantities of petroleum products needed for each of the various uses. The figures thus obtained had then to be fitted into the over-all estimates of consumption.

A detailed discussion is given for each country, subdivided into two parts, the first establishing consumption by products and the second dealing with the breakdown by uses.

Table 1. - A COMPARISON OF THE VARIOUS ESTIMATES OF GERMANY'S OIL CONSUMPTION IN 19[illegible]

(In thousands of metric tons)

	1	2	3	4	5	6
Large motor fuel[a]	2,035	2,035	1,[illegible]	1,[illegible]	2,300	--
[illegible] gasoline	--	193	--	[illegible]	--	--
Kerosene	100	108	100	--	--	--
Lubricants	850	870	750	--	[illegible]	--
Gas oil						
Motors	(	(	1,[illegible]	1,[illegible]	(	[illegible]
Technical	(1,880	(1,838	--	[illegible]	(1,[illegible]	[illegible]
[illegible]	(	(	350	[illegible]	(	[illegible]
Fuel oil						
Domestic	(1,025	385	[illegible]	--	--	--
Bunker	(	637	130	--	--	--
Bitumen	820	856	884	--	--	--
Paraffin wax	70	--	--	--	--	--
Liquid gas	--	--	--	--	70	--
Technical oils[b]	530	135[c]				
Total	7,880	7,385	7,312	[illegible]	5,400	[illegible]

* Estimates in columns 4, 5, and 6 are incomplete, referring only to categories shown.

Sources:

Column 1. Handbuch der deutschen Mineraloelwirtschaft, 1939.
2. Shell Oil Company - Newspaper report.
3. Standard Oil Company, N. J.
4. [illegible] und Zahlen der deutschen [illegible]wirtschaft, [illegible].
5. Oel und Kohle - 15 August 1939.
6. [illegible] Zeitung, 4 [illegible] 1939.
a. Including alcohol and benzole.
b. Of which [illegible],000 tons were used in agriculture.
c. Technical benzole.

[illegible] consumption of petroleum products [illegible] figures [illegible] given below.

(In thousands of metric tons)

Products	[illegible]	[illegible]	[illegible]
Light motor fuel	[illegible]	[illegible]	[illegible]
Kerosene	[illegible]	70	[illegible]
Lubricants	[illegible]	[illegible]	[illegible]
Gas oil	1,65[illegible]	66	1,[illegible]
Fuel oil	2,09[illegible]	50	[illegible]
Total consumption	[illegible]	[illegible]	[illegible]

Technical oils ([illegible] Table 1) has been included with light motor fuel. Solid petroleum products (lines 17 and 18) have been [illegible].

Table 2 on the following page shows the breakdown of consumption by uses. Section 3 following the table shows how these [illegible].

TABLE 1 GERMANY: COMMERCIAL AND CIVILIAN CONSUMPTION OF PETROLEUM PRODUCTS BY USES IN [illegible]

(In thousands of metric tons)

Use	Light Motor Fuel	Kerosene	Lubricants	Gas oil	Fuel oil	Total
Road Transportation						
Motorcycles	315.0	--	11.5	--	--	[illegible]
Private cars	1,190.0	--	[illegible]	--	--	[illegible]
Buses	225.0	--	14.0	[illegible]	--	[illegible]
Trucks and special vehicles	1,230.0	--	[illegible]	390.0	--	1,700.[illegible]
Farm tractors	[illegible]	[illegible]	[illegible]	65.0	--	[illegible]
Vehicles driven by generators	--	--	[illegible]	--	--	[illegible]
Total road transportation	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]
Railways:						
Military	[illegible]	--	1.5	[illegible]	--	[illegible]
Other: locomotives, steam locomotives, and trains	--	--	[illegible]	[illegible]	--	[illegible]
Total Railways	[illegible]	--	[illegible]	[illegible]	--	[illegible]
Shipping:						
Coastal	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Inland:						
Motor ships	--	--	[illegible]	[illegible]	--	[illegible]
Small craft	10.0	--	[illegible]	--	--	[illegible]
All others	--	--	[illegible]	--	25.0	[illegible]
Total inland	[illegible]	--	[illegible]	[illegible]	25.0	[illegible]
Total shipping	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Civil aviation	[illegible]	--	[illegible]	--	--	[illegible]

(continued on next page)

[illegible] (continued)

([illegible] thousands of metric tons)

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]
[illegible] motors	[illegible]		[illegible]	—	—	[illegible]
[illegible] motors			[illegible]	10.0	—	[illegible]
[illegible] machines			[illegible]		[illegible]	[illegible]
[illegible] culture	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]
[illegible]						
[illegible] power	[illegible]	—	—	[illegible]	—	[illegible]
[illegible]	[illegible]	—	[illegible]	[illegible]	—	[illegible]
[illegible]	—	—	—	[illegible]	401.0	[illegible]
[illegible]	—	—	[illegible]	—	—	[illegible]
[illegible] industry	[illegible]	—	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	1,755.3	1,113.0	[illegible]

Given in table 2.

1. Load transported: Estimates of the consumption of petroleum products by motor vehicles have been based on the following registration figures for 1938 as published by the Statistisches Reichsamt:

Type of Vehicle			Number
Motor cycles			1,382,872
Private automobiles			1,305,284[a]
Buses:	Gasoline-engined	12,305	
	Diesel-engined	7,206	
	Substitute fuel	1,201	
	Total buses		20,712
Lorries:	Gasoline-engined	311,020	
	Diesel-engined	80,045	
	Substitute fuel	10,501	
	Total lorries		401,056
Special vehicles			11,382
Tractors:	Gasoline-engined	40,198	
	Diesel-engined	13,747	
	Substitute fuels	651	
	Total tractors		54,043
Total registrations			3,174,350

[a] Another 574 cars were driven by electricity.

These aggregate registration figures, however, do not provide a sufficient basis for the calculations. In view of the differences in both fuel consumption and average mileage, statistics are required which will show the breakdown in terms of size, or carrying capacity, of the number of vehicles in each of the above classes.

[illegible] of propulsion (gasoline, Diesel-engined and substitute)

the two sets are not correlated. Only since July 1937 have registrations been compiled in such a way as to provide this information and then only for the registrations of new vehicles. These statistics were used as a guide in classifying the total registrations for 1938, according to size and method of propulsion.

The same kind of calculation has been necessary for tractors. But here additional difficulties were encountered. First of all, in Germany as in many other European countries, not all agricultural tractors were registered; second many of the gasoline-engined tractors actually were kerosene; and thirdly, a great many tractors were provided with Glühkopfmotoren and used no oil which the Germans called 'Vergaser-Öl' and which has been classified here as gas oil.

No data on the number of vehicles which, though registered, were temporarily out of use have been published since 1937. Since the percentage of vehicles in this category in 1938 should have been very low, this factor has been ignored in the present study.

The number of vehicles by size and type in use in Germany and Austria as of 1 July 1938 is shown in Table 5 on the following page.

Table 5. MOTOR VEHICLES IN USE IN GERMANY AND AUSTRIA
AS OF 1 JULY 1958

A. Motorcycles

Cylinder capacity (in cc)	Number of vehicles
Under 100	521,198
101-250	804,818
251-350	169,368
351-500	224,389
Over 500	55,304
Total	1,800,872

B. Private Cars

Cylinder capacity (in liters)	Number of vehicles
Under 1	323,071
1-2	783,657
2-3	191,596
3-4	84,360
Over 4	11,284
Total	1,396,284[a]

C. Trucks

Carrying capacity (in metric tons)	Gasoline[b]	Diesel[b]	Substitutes[b]	Total
Under 1	167,959	275	4,301	172,455
1-2	66,468	3,500	8,000	77,968
2-3	51,665	18,700	4,000	74,365
3-4	14,815	15,200	2,800	32,815
4-5	7,272	5,700	300	13,272
Over 5	3,443	7,000	--	10,443
Total	311,620	50,375	18,501	381,098[c]

a. Another 311 cars were driven by electricity.
b. Breakdown is estimated.
c. Including 87,274 three-wheeled vehicles, but excluding 17,450 special vehicles.

Table 5 (continued)

Buses

Seating capacity	Gasoline[a]	Diesel[a]	Substitutes[a]	Total
Under 17	1,936	[illegible]	[illegible]	[illegible]
17-21	8,795	[illegible]	[illegible]	10,540
Over 21	1,307	[illegible]	[illegible]	[illegible]
Total	12,305	[illegible]	[illegible]	20,[illegible]

Tractors

Horsepower	Gasoline[a]	Diesel[a]	Substitutes[a]	Total
Under 26	8,030	10,791	468	[illegible]
26-40	2,700	20,219	921	[illegible]
41-60	229	7,802	57	[illegible]
61-80	---	3,077	---	[illegible]
Over 80	---	1,427	---	[illegible]
Total	10,959	43,327[b]	857	[illegible]

Recapitulation of Vehicles driven by Substitute Fuels

	Buses[c]	Trucks[d]	Tractors[c]	Total
Gas generators	69	1,250	40	[illegible]
Compressed gas	55	811	10	[illegible]
Liquid gas	1,069	8,640	210	[illegible]
Electricity	80	1,000	317	[illegible]
Total	1,201	[illegible]	[illegible]	[illegible]

a. Breakdown is estimated
b. Includes 17,318 Glockkopfmotoren, driven by gas oil
c. Breakdown is estimated.
d. Including 35 steam tractors.

The estimates of average annual consumption of fuel per motor vehicle were based on reports from the German motor industry, on German trade sources and in part on an unpublished memorandum of the Petroleum Press Bureau, London.

The suggested average annual mileage for trucks in Germany is somewhat higher than the comparable British figure because commercial goods transportation has made more rapid progress in the former country.

It is very difficult to estimate the average annual mileage of buses. In England it has been estimated at between 30,000 and 40,000 kilometers per annum; for Germany it has been put at 40,000 kilometers per annum. This figure is much higher than that for the United States where the great number of school buses reduces the average considerably.

The consumption of petroleum products by tractors could be established only on an over-all basis. German sources gave the average annual consumption of a small Diesel tractor of 11-18 h.p. as 0.8 to 1.2 tons of gas oil per annum; that of a tractor of 20-25 h.p. as 2 to 3 tons; and that of a medium or heavy tractor as 5 to 6 tons. This would correspond to an average operation of about 1,000 hours per year per tractor. As over 70 percent of all German Diesel tractors were of more than 25 h.p. the annual average tractor consumption has been estimated at 4.6 tons. Gasoline tractors were mostly below 25 h.p., but in view of their greater unit consumption, the annual average requirement was also put at 4.6 tons. Kerosene [illegible] kerosene. Consumption [illegible] requirement figures [illegible] Table 4.

Table 1. AVERAGE ANNUAL [illegible] MILEAGE OF SPECIFIED MOTOR VEHICLES, 1938

	Average unit motor fuel Consumption per 1,000 kilometers (in kilograms)	Average annual performance (in kilometers)	Gasoline (in gallons per year)
Gasoline	**Gas oil**		
Motorcycles (in cc)			
Under 250	[illegible]	[illegible]	0.180
Over 250	[illegible]	[illegible]	0.250
Private cars (in liters)			
Under 1	97.4	10,000	0.350
1-2	[illegible]	[illegible]	[illegible]
2-3	84.0	16,000	1.300
3-4	102.2	20,000	2.000
Over 4	115.6	30,000	3.000
Trucks (capacity in tons)			
Under 1	240.0	96.0	16,000	2.00	0.01
1-2	165.0	125.0	19,000	6.115	0.05
2-4	192.0	156.0	30,000	6.000	1.000
4-6	250.0	180.0	35,000	8.000	1.000
6-8	333.0	232.0	40,000	13.000	2.000
Over 8	407.0	285.0	50,000	20.000	11.000
Buses (average)	166.0	260.0	50,000	15.000	10,000
Tractors (average)					

Gasoline	1,000
Kerosene	[illegible]
Total	[illegible]

The average unit consumption of the various categories of vehicles are shown in Table 5.

Lubricating-oil demand for road transportation has been estimated on the basis of the relationship between lubricating-oil consumption and motor-fuel consumption. According to reports of the [illegible], lubricating-oil requirements for gasoline motors amount to 3.7 percent by weight of the fuel used while those of Diesel units amount to 6.4 percent. For generator vehicles, a flat rate of 0.15 tons of lubricants per year per vehicle is suggested. These rates, though they seem somewhat high for European countries, have been used.

In estimating total consumption in road transportation, only those tractors have been included which were employed mainly on the road. It has been assumed that some 25 to 30 percent of the registered tractors were used on the road and 70 to 75 percent in agriculture.

Table 5. AVERAGE UNIT CONSUMPTION OF GERMAN ROAD VEHICLES [illegible]

(In kilograms per vehicle)

	Motor fuel	Gas oil
Motorcycles	193	--
Private cars	910	--
Buses	10,250	13,000
Trucks[a]	4,020	6,850
Tractors	4,500[b]	4,500

a. Includes special vehicles.
b. Petroleum consumption of tractors:

Gasoline	[illegible] tons
Kerosene	[illegible] tons
	[illegible] tons

4. Railroads. The oil requirements of the German State Railways (Diesel railcars and for the lubrication of engines and rolling stock) are published in the official railway reports for 1938. The information given does not include the oil consumption of Diesel locomotives which were not used for switching purposes. The report contains no information on the number of such locomotives, stating only that there were altogether 1,400 small locomotives. Early in 1939, the British paper Oil Engine reported that towards the end of 1938 Germany owned or had ordered some 1,175 Diesel locomotives. According to an American survey, medium to large switching engines consume 15 to 22 kilograms of gas oil per hour. It is assumed that during 1938 some 750 Diesel locomotives were in use for an average of 4,000 hours; that 250 of these were large engines consuming 20 kilograms an hour and that 500 were small ones needing 15 kilograms an hour. On this basis the total requirements for Diesel locomotives would have amounted to 60,000 tons of oil. Total oil consumption of the German railways is shown in Table 6.

5. Shipping. Oil for the shipping industry falls naturally into two categories: bunker and inland. Figures for bunker oil demand by ocean shipping have been taken from the German customs statistics. The requirements for inland shipping had to be pieced together from such fragmentary data as were available.

Imports of gas oil for inland shipping enjoyed a special tariff and the requirements for motorships were therefore specified in the German customs statistics for 1938[1].

The size of the German inland shipping fleet is shown in Table 7. In addition, however, there were some 40 ocean ships which used gas oil

[1] The small domestic production of gas oil was not used for motorships.

(1) Consumption of the German State Railways in 1929

(In metric tons)

	Motor fuel		Lubricants
Steam:			
Germany	2,000	21,560	1,150
Austria	--	3,000	120
Total railcars	2,000	24,560	1,270
Locomotives			
Diesel locomotives	--	40,000	--
Steam locomotives and steam			
Germany	--	--	21,000
Austria	--	--	2,000
Total locomotives	--	40,000	23,000
Total Reich	2,000	64,560	24,270

Lubricating Oil Consumption per Locomotive and per Million Locomotive-Kilometers

(In kilograms)

1. German Proper

	1926	1927	1928	1929	1930
Motor fuel consumption per 1,000 Railcar-kilometers	654.55	537.60	--	--	--
Lubricating oil consumption per 1,000 Railcar-kilometers	31.41	31.03	--	--	--
Lubricating oil consumption per 1,000 Locomotive-kilometers	21.00	22.18	22.65	23.03	21.44

2. Austria

Lubricating oil consumption per 1,000 locomotive kilometers	

Table [illegible]

	Number of ships	Horse Power (In thousands of h.p.)	Loading Capacity (In thousands of tons)
[illegible]			
[illegible]	[illegible]	[illegible]	–
[illegible]	[illegible]	[illegible]	–
[illegible]*	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Ships without own power	[illegible]	–	[illegible]

* As of 1 January [illegible], 8 ships of 371 h.p. used [illegible] and [illegible] ships of [illegible] h.p. were driven by electricity.

Additionally they were grouped with 600 other ships which burned coal. These 800 ships had a combined horsepower of 100,000. It has been estimated that the horsepower of the 40 ships was 4,000 by allocating 40/800 of the total to the fuel oil burning ships. According to British estimates, consumption of fuel oil per horsepower amounts to 1,047 metric tons during a year of 185 ten-hour days; the daily consumption is 0.8 kg. per horsepower per hour. The 40 ships therefore required 15,000 tons of fuel oil annually.

Some 540 small ships (not shown in Table 7) with a total horsepower of less than 20,000 were driven by light motor fuel. Their requirements have been estimated at 10,000 tons of motor fuel.

No adequate basis for a calculation of Austria's oil requirements for inland shipping is available. Shipping on the Danube was, however, of great importance not only for Austria but for all the Danubian countries. About 50 percent of the shipping on the Danube in Austria was transit, but some of those ships purchased in Austrian ports and considerable quantities of fuel oil were used. Tentatively their demand has been put at 15,000 tons. The Austrian requirements for gas oil have been arbitrarily put at 5 percent of the German figure.

Lubricating oil consumption has been estimated at about 3 or 4 percent of the fuel used by Diesel and gasoline-engined ships. The lubricating oil requirements for coal-burning ships, estimated on the basis of their combined horsepower, have been put at 3,000 tons.

4. Aviation. The only available clue to the extent of petroleum

[illegible] tons would have been needed for every million kilometers. In arriving, 50 percent has been added to the requirements of the commercial airlines to cover sport flying, civil training, etc. According to [illegible] lubricating oil requirements amounted to [illegible] percent (by weight) of the [illegible] fuel consumption.

3. Agriculture. Information on oil consumption by German agriculture [illegible] in a survey made by the Statistisches Reichsamt for the year [illegible]. The survey reports that the consumption of oil by agriculture during that year was as follows:

[illegible] fuel	[illegible],000 tons
Gas oil	[illegible],000 tons
Lubricants	[illegible],000 tons
Total	[illegible],000 tons

The only information available on the number of agricultural machines used covers the Old Reich for 1938 and Germany [illegible] 1939. These figures are given in Table [illegible] on the following page, together with an OSS estimate for [illegible]. It should be remembered that trucks and other road vehicles used by farmers are not included in agricultural consumption.

Table [illegible]. - MACHINES USED IN GERMAN AGRICULTURE [illegible], 195[illegible], AND [illegible]

	1939 Germany and Austria	19[illegible] Old Reich	19[illegible] [illegible] ([illegible])
Stationary motors			
Gasoline motors (and kerosene)	14[illegible],95[illegible]	{ 7[illegible],[illegible]	[illegible]0,0[illegible]
Gas and Diesel-oil motors	48,160	(	[illegible]0,0[illegible]
Total Stationary Motors	1[illegible]9,0[illegible]0	7[illegible],[illegible]	1[illegible],0[illegible]
Tractors			
Up to 8 h.p.	11,41[illegible]	...	
8-22 h.p.	18,900	...	
Over 22 h.p.	38,660	...	
Total Tractors	68,980[a]	[illegible]	[illegible][b]
Electric motors	1,104,665	1,[illegible]75,400	
[illegible] Locomobiles	11,764	15,887	

[a] 1939 Diesel-engined [illegible]
Gasoline or kerosene [illegible] (U.S. estimate)

[b] 19[illegible] Diesel-engined [illegible]
Gasoline or kerosene - [illegible]

consumption for each type of agricultural machine for the year [illegible].

In making the calculations for 1951, the data on the number of different kinds of machines in 1949 were used. The greater part of machines in 1950 is believed to have been adequately offset by the more intensive use of equipment in 1949.

The use of tractors in 1950 was presumed to have been 6% greater than in 1949.

6 Industry. The consumption of gasoline (including white spirit), gas oil for physical and technical purposes, as solvents for carburettors, etc., was as follows in 1950:

Gasoline	300,000 tons
Gas oil	150,000 tons

The information is based on customs data, on a special tariff applied to these products and domestic production of residual oils not subject to [illegible]. Since no data were available for producers, a flat [illegible] has been added to the above figure.

The amount of light motor fuel and gas oil consumed by stationary industrial engines has been estimated on the basis of a survey of the increase in horsepower of industrial engines between 1949 and 1950. The increase during this period was from 600,000 h.p. to 1,200,000 h.p. It is assumed that the rate of increase declined after 1950 owing to the efforts of the German government to keep down oil consumption. Thus the horsepower of industrial engines in Germany in 1955 and 1960 has been estimated as follows:

1955	1,650,000 h.p.
1960	2,100,000 h.p.

At the World Power Conference held in Vienna in 1938, it was emphasized that the use of liquid fuel in German industries was to be restricted because of Germany's policy of autarky. It was also stated that in 1936 the total horsepower of motor engines in the small industries was [illegible], of which 10 percent was accounted for by Diesel engines.

It has been estimated that of the total of 1,[illegible],000 h.p. installed in industry in 1943, small industries accounted for [illegible] h.p. and large factories for 1,[illegible] h.p. An estimated [illegible] h.p. were generated by gasoline motors and [illegible] h.p. by Diesel engines.

The demand for Diesel oil for industrial engines in 1938 has been estimated on the basis of consumption figures available for the year [illegible] 1935. In that year [illegible] amounted to [illegible] tons. The demand for Diesel oil between 1938 and 1943 is assumed to have risen in proportion to the increase in horsepower of the engines and an estimate of 500,000 tons has been reached for the year 1943. The requirements of gasoline for small industries have been put at 10,000 tons.

For Austrian requirements, 5 percent has been added to Germany's consumption of both gas oil and gasoline, raising the totals to [illegible] and [illegible] tons respectively.

On the basis of the meager information available, an estimate of [illegible] tons has been made for gas oil used in industry for heating.

Probably 100,000 to 150,000 tons of the total gas oil was consumed in [illegible]

is completely satisfied by the refinery output from domestic crude oil and bar oils. The German demand for 1937 was officially estimated at 180,000 tons. For 1938, however, a figure of 150,000 tons was reached by substituting, the requirements for all other purposes from the total consumption figure of 1,125,000 tons. The principal reason for this decrease is that domestic production of crude oil had expanded considerably and had made additional quantities of heavy fuel oil available to German industry.

Fuel oil consumption in Austria was comparatively much less per head than in Germany. It has been tentatively put at 50,000 tons.

It has now been possible to distribute total industrial consumption of oil among the various types of industry.

The demand for lubricating oil for industrial purposes was estimated by assigning to this category all lubricants not included under any of the other headings considered above. Although the balance thus obtained would include lubricants used in locomotives or for other special purposes, the quantities were considered to be too small and a further breakdown was not justified. The home deliveries for industrial purposes were thus set at 369,000 tons.

7. Household. The requirements of kerosene for household purposes were calculated by subtracting the amounts used for all other purposes from the total consumption of 770,000 tons.

III CZECHOSLOVAKIA

A. Consumption, Imports and Distribution of Mineral Oil Products in 1938.

In the autumn of 1938 Czechoslovakia was dismembered by the incorporation of the Sudeten territory into the German Reich. In March 1939 the Protectorate of Bohemia and Moravia and the puppet state of Slovakia were established. The present survey is concerned with the petroleum resources of pre-Munich Czechoslovakia and the estimates refer to 1937.

The following estimate of petroleum products consumed in 1937 is based on trade statistics for that year and on figures covering domestic refining and production:

	Consumption
	(In thousands of metric tons)
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Total consumption	[illegible]

Table 9 on the following page shows the breakdown of petroleum consumption by uses. Section 8 following the table shows how these estimates were reached.

TABLE 9 — CONSUMPTION: INDUSTRIAL AND CIVILIAN CONSUMPTION OF PETROLEUM PRODUCTS BY USES IN 1974

(In thousands of metric tons)

Use	Light Motor Fuel	Kerosene	Lubricants	Gas Oil	Fuel Oil	Total
Road Transportation:						
Motorcycles	14.0	—	0.1	—	—	14.1
Private cars	75.0	—	2.7	—	—	77.7
Buses	25.0	—	1.2	4.0	—	30.2
Trucks	128.0	—	2.0	8.0	—	138.0
Total Road Transportation	242.0	—	6.0	12.0	—	260.0
Railways	8.0	—	1.5	5.0	—	14.5
Shipping	2.0	—	0.5	6.0	2.5	11.0
Civil Aviation	4.0	—	0.2	—	—	4.2
Agriculture	4.0	15.0	5.0	2.0	—	26.0
Industry	13.2	4.0	30.0	19.2	85.0	151.4
Household	—	60.0	—	—	—	60.0
Total	360.0	80.0	50.0	55.0	85.0	630.0

Notes to Table 9.

1. Road Transportation. The most important single use of petroleum products in Czechoslovakia was road transportation. A summary of registration figures for 1937 follows:

Type of Vehicle			Number
Motorcycles			60,565
Private cars			54,844
Buses:	Gasoline-engined	2,685	
	Diesel-engined	400	
	Total buses		3,085
Trucks:	Gasoline-engined	22,385	
	Diesel-engined	130	
	Total trucks		22,405
Total 1937 registrations			170,777

As no direct information on oil consumption in road transportation was available, it has been necessary to make an estimate on the basis of annual average figures for the various categories of vehicle. Average unit consumption of motorcycles was put at a little less than the German figure. The unit consumption of gasoline-engined buses was estimated at about 85 percent of German requirements per vehicle and that of Diesel-engined buses at 75 percent of German consumption per vehicle. The average size and mileage of gasoline buses in Czechoslovakia is believed to have been considerably lower than that of German buses, while Diesel buses were on the average only slightly smaller than the German buses. The unit consumption of trucks was estimated at 10 to 20 percent less than the German figure owing to the severe restrictions imposed on commercial and long distance transportation of goods.

[illegible] Some 3,250,000 tons of goods were transported on the [illegible] in 1936. The total horsepower of the ships used on inland waterways amounted to 31,000, of which 15,000 were accounted for by motor ships. In addition, many ships were engaged in international transit trade on the [illegible] and presumably were bunkered in the [illegible] ports. On this basis, the total bunker demand has been put at 2,000 tons of gas/diesel [illegible] oils and 500 tons of lubricants, of which perhaps one-third was used in transit shipping.

3. Aviation. As in the case of Germany, the figures covering the oil requirements of aviation have been based on the distance flown by the commercial airlines (2,000,000 kilometers). An estimate of 4,000 tons for 1936 was reached, which includes an allowance of 5 percent of commercial gasoline consumption to cover private flying.

4. Railways. The figures covering the oil requirements for railroad transportation have been taken from the official [illegible] reports of the railways. Since they have been given in great detail, these have been summarized in Table 10 on the following page. The total number of locomotive kilometers in 1936 was 171 million.

(In metric tons)

	Light Motor Fuel	Gas Oil	Industrials	Lubricating Oils & Greases
[illegible]	—	—	[illegible]	[illegible]
[illegible]	—	—	[illegible]	[illegible]
[illegible]	9,328	5,806	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

V. ITALY AND ALBANIA

A. Industrial and Civilian Consumption of Mineral Oil in Italy and Albania in 1938.

The mineral oil consumption of Italy cannot be reliably calculated on the basis of available foreign trade and domestic production statistics. Import statistics do not include bunker oil requirements for the Italian merchant marine and Navy (about 1,200,000 tons) and do not distinguish between fuel oil and cracking stock brought into the country from abroad. The figures given in Table II on the following page are based on net imports and domestic production and are therefore not wholly representative of Italian consumption.

Another indication of the size of requirements (excluding bunkers) is supplied by official Italian figures covering imports and refinery licenses as granted by the Government to Italian oil companies (see table 12 on page 32)

As compared with the figures given in Table II and Table IX, Table XI (on page 38) contains several sets of figures on actual consumption of petroleum products in 1938 as estimated by oil companies operating in Italy and by semi-official Italian sources.

2. Railways. [illegible] railways [illegible] Fuel oil [illegible] consumed by them [illegible] of about [illegible],000,000 [illegible] The [illegible] consumption [illegible] requirements [illegible] railways in 1958 [illegible] state railway report [illegible] the [illegible] total number of locomotive kilometers in 1958 amounted to 302 million.

3. Shipping. [illegible] 60,000 tons of [illegible] and inland [illegible] including coastal shipping.

4. Aviation. In 1958 the Italian airways flew 12,300,000 kilometers. Using this figure as a guide, the total requirements of [illegible] fuel for civil aviation have been put at 55,000 tons. [illegible]

5. Agriculture. In addition to 18,[illegible] registered agricultural tractors, 15,000 non-registered tractors were used on farms. According to these sources, agricultural oil requirements in 1958 amounted to [illegible] tons of kerosene and about [illegible] tons of [illegible] ,000 tons of [illegible] oil were probably needed by other machinery used on farms. Total [illegible] oil requirements [illegible] about 6 percent of [illegible]

The statistics for Hungary's oil consumption in 1938 have been taken from official sources and are based on data for domestic refining and imports. The industrial and civilian consumption of petroleum products in 1938 has been estimated as follows:

Products	Consumption (in thousands of metric tons)
Light motor fuel	78.4
Kerosene	72.5
Lubricants	18.1
Gas oil	50.6
Fuel oil	63.6
Total consumption	281.6

It must, however, be remembered that Hungary annexed some 4,200 square miles of Czechoslovakian territory at the Vienna Conference in November 1938 and some further 4,250 square miles in March 1939. These territorial changes were partly responsible for an increase in demand in 1939. In August 1940, the Vienna Conference awarded Hungary the northern part of Transylvania. The total annual requirements of Greater Hungary may be put at 360,000 to 400,000 tons. The present study, however, is confined to an analysis of the pre-war consumption of Hungary proper and the removal of the restrictions imposed before and during the war has been included in the prospective requirements of Czechoslovakia and Yugoslavia.

Table IV on the following page shows the breakdown of Hungarian consumption by end-use. Section B following this table [illegible]

Though relatively poorly motorized, the average consumption per vehicle was somewhat higher than in most other northwestern European countries. Road transportation of goods and passengers was of considerable importance. In 1957 the state railways maintained 70 percent and in seasonal bus services. 888 trucks were engaged in long-distance goods transport over some 50 million kilometers, using about 1 400 tons of petrol, the local gasoline alcohol combines, of 3.5 tons per truck. About 30 percent of all trucks had a carrying capacity of over 5 tons. The average annual consumption of the various categories of vehicles was put slightly higher than the German figure, mainly because of the

TABLE II. MINERAL MATERIAL AND OIL-BASED CONSUMPTION OF PETROLEUM PRODUCTS BY USES IN 1964

(In thousands of metric tons)

	Light motor fuel	Kero-sene	Lubri-cants	Gas oil	Fuel oil	Other
Road Transportation						
Motorcycles	0.6	--	--	--	--	--
Private cars	28.0	--	[illegible]	--	--	[illegible]
Buses	21.0	--	[illegible]	0.5	--	[illegible]
Trucks	11.0	--	[illegible]	0.2	--	--
Total Road Transportation	[illegible]	--	[illegible]	[illegible]	--	[illegible]
Railways	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]
Shipping	[illegible]	0.6	[illegible]	[illegible]	[illegible]	[illegible]
Civil Aviation	[illegible]	--	[illegible]	[illegible]	--	[illegible]
Agriculture	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]
Industry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Household	--	[illegible]	--	--	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

A. Notes to Table 13.

1. Road Transportation: The number of motor vehicles in Rwanda was very small. In fact, in all the five European and predominantly countries - Yugoslavia, Poland, Hungary, Albania, and Ireland - the ratio of motor vehicles to population was abnormally low. The registration of motor vehicles in Rwanda in 1958 was as follows:

Type of Vehicle		Units	
Motorcycles			2,500
Private cars			25,600
Buses:	Gasoline-engined	3,337	
	Diesel-engined	30	
	Total buses		3,367
Trucks:	Gasoline-engined	10,142	
	Diesel-engined	58	
	Total trucks		10,200
Total registrations			41,667

Though the degree of motorization was very low, the utilization of oil was relatively high except in the case of commercial road traffic which was hampered by many restrictions. The annual rate of consumption per motorcycle and per private car has been substantially higher than the German figure, that of buses at 70 percent of the German rate, and that of trucks at about the same rate as the German. Every Diesel bus probably needed less oil than those in the trucks.

2. Railways. One of the largest oil consumers in the country was the railways. Approximate quantities of fuel oil were used for locomotive-hauling oil consumption was estimated on the basis of locomotive-) they amounted to 85.8 million kilometers, (including

railcar-kilometers). Assuming that requirements per kilometer were double those of Germany, some 4,000 tons of lubricants would have been needed. A total of more than 270,000 tons of oil products were thus consumed by the railways in 1938, as shown in Table 19 on the following page.

5. Shipping. Shipping accounted for about one-fifth of the total consumption of petroleum products in Rumania in 1938 (see Table 20 on page 61).

Prior to 1939, Rumanian statistics were broken down in such a way that it was not possible to distinguish between the amounts of bunker oil used by Rumanian ships and those used by foreign ships. It is known however, that the total bunker requirements for 1938 were a little over 381,000 tons. In 1939 the sales of bunker oil were about evenly divided between Rumanian and foreign ships, i.e., about 150,000 tons each. Because of the war, all shipping had been reduced in 1938 and it has, therefore been assumed that in 1938 the requirements of Rumanian ships were at least 170,000 tons.

6. Aviation. Oil requirements for commercial aviation on the basis of the operation statistics for air transport companies amounted to about 1,600 tons, including an arbitrary 50 percent added to cover private flying, training, etc.

Table 19. OIL CONSUMPTION OF THE MALAYAN STATE RAILWAYS

(In metric tons)

	1938	1937
Boiler fuel	3,000[a]	3,000
Oil	5,000[a]	4,480
Gasoline	400 (est.)	400
Lubricants	4,000	3,800
Total	272,000	268,280

a. Estimated.

Table [illegible]. [illegible] OIL [illegible]

(In metric tons)

	[illegible]	[illegible]
[illegible]	[illegible]	...
Kerosene	585	...
Lubricants	[illegible]	...
Gas oil	[illegible][a]	...
Fuel oil	[illegible][b]	...
Total - 1959	[illegible]	
Total - 1960		[illegible][c]

a. Gas oil requirements for foreign ships amounted to an estimated [illegible] tons.

b. Fuel oil requirements for foreign ships amounted to an estimated [illegible] tons.

c. In [illegible], 131,[illegible] tons were supplied to [illegible] ships and [illegible] to foreign ships.

5. Agriculture. Agricultural demand had been expanding prior to 1939. In Rumania, as in so many other countries, motor vehicle registrations did not include all the tractors used on farms. At the World Power Conference of 1936, it was stated that 4,585 tractors were employed in Rumanian agriculture in 1933. By 1938 their number may be estimated at around 6,000 units, (of which 2,000 were registered). Agricultural kerosene consumption has been put at 18,000 tons, but certain quantities of gas oil and motor fuel were also used. Tentatively, they have been estimated at 4,000 tons of gasoline, 8,000 tons of gas oil, and 2,000 tons of lubricating oil. Here, as in other countries, a considerable number of motor vehicles were used by farmers on the road and have been included under road transport uses.

6. Industry. Industrial requirements for fuel oil in 1938 amounted to nearly 700,000 tons and those of gas oil to about 30,000 tons. More than 100,000 tons of fuel oil were needed in domestic refineries according to their operation statistics. Some 38,000 tons of heavy gasoline and perhaps 3,000 tons of other motor fuel were also consumed by industrial motors. In addition, about 14,000 tons of kerosene and white spirits were needed. Lubricating oil available to industry has been calculated at around 15,000 tons. These figures should, however, be treated with [illegible].

7. Household. According to trade sources, 145,000 tons of kerosene were used for lighting, and some 30,000 tons for washing and cooking. [illegible]. In addition, 150,000 tons of fuel oil were used for central [illegible]

Table 21. BULGARIA: INDUSTRIAL AND OFFICIAL CONSUMPTION OF PETROLEUM PRODUCTS BY USER IN 1970

(In thousands of metric tons)

[illegible]	Light motor fuel	Kero-sene	Automo-tive	Gas Oil	Fuel Oil	Total
Road Transportation						
Motorcycles	0.7					
Private cars	2.3	...		...		
Buses	4.9	...			...	
Trucks	8.9	...				
Total Road Transportation						
Railways	...	...			...	
Shipping	...	...				
Aviation						
Construction					...	
Industry						
Domestic	...			...	...	
Total						

B. Notes to Table 21.

1. Road Transportation. Motor vehicle registrations in Bulgaria in 1938 were as follows:

Type of Vehicle			Number
Motorcycles			2,093
Private cars			2,505
Buses:	Gasoline-engined	580	
	Diesel-engined	50	
	Total buses		630
Trucks:	Gasoline-engined	1,507	
	Diesel-engined	116	
	Total trucks		1,623
Total registrations			7,706

The average unit consumption of motorcycles and private cars has been put at approximately the same rate as the German. The unit gasoline consumption of buses has been estimated at 60 percent of the German figure, while heavy Diesel-engined buses probably consumed 75 percent of the quantities used in Germany. Trucks needed about the same quantity of gasoline per vehicle as in the Reich; their gas oil requirements were probably a little lower as commercial goods transportation, in which most Diesel trucks were employed, was less developed than in Germany.

2. Railways. Detailed official statistics covering the oil consumption of the Bulgarian railways are available for 1937. Estimates of consumption in 1938 have been based on these statistics and are shown in Table 22.

Table 22. OIL EQUIVALENTS OF THE DIFFERENT FUELS

(In metric tons)

	Lubricants		Gas oil	
	1966[a]	1967	1966[a]	1967
Locomotives and trains	5,060			
Vehicles				
Other	11040			

a. Estimated.

b. Lubricating oil consumption per 1,000 ton-kilometres transported: 1967 kilograms.

c. Lubricating oil consumption per 1,000 vehicle-kilometres run: 1967 kilograms.

As the table indicates, the rate of consumption of lubricating oil per 1,000 locomotive-kilometers was nearly six times the German figure. It may be mentioned that during the whole of 1957 only 250,000 kilometers were traversed by Diesel railcars. In 1958 the rate of operation must have risen considerably for, by the end of 1957, 85 Diesel railcars were in service or on order.

Diesel-oil demand for 1962 has tentatively been put at 500 tons. This is a conservative figure since Rumania had about twice as many railcars and used ten times as much gas oil.

3. Shipping. As in the case of Hungary, there was little information to indicate the size of bunker oil requirements for inland shipping and the Black Sea ports. Tentatively they have been put at 5,000 tons of gas oil and 2,000 tons of fuel oil.

4. Aviation. The civilian consumption of aviation gasoline in Bulgaria was so small that it has been omitted from this estimate.

5. Agriculture. Horticulture in Bulgaria was highly developed and according to trade sources, agriculture needed about 8,000 tons of kerosene. It has been necessary to make a rough estimate of other oil products needed on the farms: they have been put at 3,000 tons of motor fuels, 2,000 tons of gas oil, and 1,000 tons of lubricants.

6. Industry. The balance of heavy oils, motor fuels and lubricants has been assigned to industry.

7. Household. It has been estimated that about 20,000 tons of kerosene were used for [illegible].

VIII. FINLAND

A. Industrial and Civilian Consumption of Petroleum Products in Finland in 1950.

The estimates of oil products consumed in Finland in 1950 have been based on import statistics and information from trade sources, and are as follows:

Products	Consumption (in thousands of metric tons)
Light motor fuel	156.0
Kerosene	69.0
Lubricants	17.3
Gas oil	40.4
Fuel oil	2.5
Total consumption	285.2

Table 23 on the following page gives the breakdown of petroleum consumption by uses. Section B following the table shows how these estimates were derived.

Table 23. FINLAND: [illegible] CIVILIAN CONSUMPTION OF PETROLEUM PRODUCTS [illegible]

(In thousands of [illegible] tons)

Use	Light Motor Fuel	[illegible]	Lubricants	[illegible]	[illegible] Oil	Total
Road Transportation						
Motorcycles	1.4	--	0.5	--	--	[illegible]
Private cars	20.0	--	[illegible]	--	--	[illegible]
Buses	35.0	--	1.5	1.5	--	[illegible]
Trucks	70.0	--	[illegible]	1.6	--	[illegible]
Total Road Transportation	[illegible]	--	[illegible]	[illegible]	--	[illegible]
Railways	--	--	[illegible]	[illegible]	--	[illegible]
Shipping						
Inland	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]
Overseas	--	--	[illegible]	[illegible]	[illegible]	[illegible]
Total Shipping	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Civil Aviation	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

C. Transportation

1. Motor Transportation. The registration of motor vehicles in 1939 was as follows:

Type of Vehicle		Number
Motorcycles		8,110
Passenger cars		21,785
Buses: Gasoline-engined	2,[illegible]	
Diesel-engined	[illegible]	
Total buses		2,[illegible]
Trucks: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total trucks		[illegible]
Total registration		[illegible]

The unit consumption of motorcycles and private cars was thought to have been similar to that of Germany. It has been estimated that buses consumed about two-thirds as much gasoline and 50 percent as much gas oil per unit as in Germany. The average truck used about as much gasoline and, if Diesel-engined, about two-thirds as much gas oil as German trucks.

2. Railways. Lubricating oil requirements for the Finnish railways have been estimated by the Finnish [illegible] at 2,[illegible] tons. This would correspond to about [illegible] kilograms per 1,000 locomotive-kilometers. Gas oil requirements of the Finnish railways [illegible] about [illegible] tons.

3. Shipping. Bunker requirements for Finnish shipping, according to [illegible], are estimated to be 5,000 tons of gas oil and [illegible] tons of [illegible]

inland water transportation was very important and kerosene was widely used for motor-driven water craft. Tentatively, consumption for this purpose has been put at 6,000 tons of kerosene, 2,000 tons of gasoline, 4,000 tons of gas oil, and 500 tons of lubricants.

4. Aviation. Finnish commercial planes flew only a little over 500,000 miles. On this basis, the motor fuel requirements for civil aviation have been put at 300 tons.

5. Agriculture. About 6,000 tractors and 12,000 stationary agricultural engines were in use in 1938. Their needs have been estimated at 20,000 tons of kerosene, 7,000 tons of gasoline and 4,000 tons of gas oil. Lubricating oil requirements were estimated by the Finnish Oil Trade at 1,577 tons.

6. Industry. In 1936, some 16,662 horsepower, of a total of [illegible] horsepower installed in Finnish industry were generated by oil motors. Since that date, the use of Diesel engines has made rapid progress. Gas oil consumption has been put at 12,000 tons in 1938. Another 3,000 tons of motor fuel, 6,000 tons of kerosene and [illegible] tons of fuel oil have been allotted to industrial requirements. Lubricating oil demand reached nearly 8,000 tons.

7. Household. The use of kerosene for lighting purposes had been declining and probably did not exceed [illegible] tons in 1939. Light fuel oil (gas oil) consumption for household heating has been tentatively put at 2,000 to 3,000 tons.

8. Lubricating oil. Figures covering the minimum requirements of lubricating oil for all purposes have been calculated by the Finnish organization for the lubricating oil trade and are given in Table 24 on the following page. [illegible]

Table 24. FINLAND'S MINIMUM LUBRICATING OIL REQUIREMENTS[a]

(In metric tons)

	Lubricating oil demand
Road Transportation	
12,000 trucks	2,300
5,600 private cars	350
1,800 buses	410
Total	3,250
Railways	3,450
Shipping	
1,200 [illegible]	[illegible]
Larger vessels	450
Total	695
Agriculture	
3,000 tractors	180
18,500 stationary engines	144
Total	1,177
Industry	
Timber, cellulose, paper	1,[illegible]
Power plants	[illegible]
Metal	[illegible]
Rubber, glass, chemicals	[illegible]
Textiles	[illegible]
Mining	[illegible]
Foodstuff	173
Total	[illegible]
Grand Total	[illegible]

a. As estimated by the Finnish Lubricating Oil Importers Association.

13. FRANCE

French Industrial and Civilian Consumption of Mineral Oil Products in 1943

French mineral oil consumption for industrial and civilian purposes during 1943 has been calculated on the basis of foreign trade and domestic [illegible] As the figures show [illegible], the small indigenous production of crude oil, motor alcohol, and motor benzol has been [illegible] taking stock changes into consideration [illegible] excluding [illegible] 40,000 tons of motor fuel required by the German [illegible] consumption of petroleum products in 1943 has been [illegible]

Products	Consumption (in thousands of metric tons)
Light motor fuel	[illegible]
Kerosene	[illegible]
Lubricating oil	[illegible]
Gas oil	[illegible]
Fuel oil	[illegible]
Total consumption	[illegible]

[illegible] following [illegible] of petroleum [illegible] by [illegible] [illegible] were reached.

Notes to Table 25.

1. Road Transportation. There exist no official statistics for the number of motor vehicles in use in France. [illegible] estimates [illegible] are those made by French trade papers, which are shown in the following tabulation:

Number of Motor Vehicles in Use in 1938

Type of Vehicle		Number
Motorcycles		[illegible]
Private cars		1,[illegible]
Buses: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total buses		[illegible]
Trucks and special vehicles: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total trucks		[illegible]
Total		[illegible]

No official data are available on the horsepower or carrying capacity of private cars, buses and trucks and it is, therefore, impossible to [illegible] the average consumption per vehicle. However, it is known that unit consumption of motor fuel was lower than in most other European countries.

According to a French report submitted to the [illegible], about [illegible] percent of total gasoline consumption in [illegible] was consumed by motor vehicles. As the estimated number of motor vehicles remained stationary between 1936 and 193[illegible], it has been assumed that this percentage also holds good for 1938, which results in a total gasoline consumption by motor [illegible]. According to a [illegible] published by the [illegible] figures, [illegible] for [illegible] percent of the [illegible] consumption of gasoline in [illegible]

[illegible] tons.

[illegible] 1938 (640 million) and on the assumption that French lubricating oil consumption per kilometer is somewhat higher than the German rate, i.e., around 27 kilograms per 1,000 locomotive-kilometers. Estimated lubricating oil requirements of the French railroads in 1938 were about 16,000 tons.

3. Shipping. French trade statistics include detailed information on the bunker oil consumption of French and foreign ships engaged in domestic commerce and these data have been used in the estimate.

In 1937, [illegible] million ton-kilometers were handled by inland shipping, or about one-[illegible] of the total of French road and rail transportation. According to trade sources 25,000 tons of motor fuel were consumed by small crafts and pleasure boats, while fishing and coastal vessels [illegible] 52,000 tons of gas oil; another 21,000 tons of gas oil were needed for shipping on inland waterways; lubricating oil sales for inland shipping amounted to 8,500 tons. No data are available for fuel oil consumption which has been arbitrarily put at 20,000 tons.

4. Aviation. [illegible] and other civilian activities, has been put at [illegible] tons.

5. Agriculture. As stated above, the requirements of agricultural tractors for light motor fuel amounted to [illegible] tons. However, [illegible] stationary motors [illegible] were also [illegible]. [illegible]

gasoline, 2,600 tons of kerosene, and 8,300 tons of gas oil. The requirements of the 75,300 trucks used by farmers have been included under road transportation. In the table of fuel requirements [illegible] requirements of agriculture have been [illegible] tons, making an allowance for the lubricating oil needs of [illegible] agricultural equipment.

8. Industry. According to reports submitted to the World Power Conference in 1936, French industries in 1930 used 150,000 gasoline motors of which 100,000 were between 1 and 5 horsepower, 45,000 between 5 and 10 horsepower, and 5,000 over 10 horsepower. It has been estimated that some 135,000 tons of gasoline were needed for these stationary engines and for technical purposes. In addition, 11,000 tons of white spirit and perhaps 6,000 tons of kerosene were used for industrial purposes. Industrial gas oil demand, according to these sources, amounted in 1938 to less than 50,000 tons, of which 18,000 tons were used for carburetion purposes in gas plants.

According to the same sources, French fuel oil consumption in [illegible] was about 580,000 tons, of which [illegible] were used by industries [illegible] to adapt their burners to fuel oil. Without such [illegible] the French refining industry would have been unable to sell its output of heavy oils. Unfortunately it is not possible to present statistics on industrial fuel oil consumption by uses. It is only known that 70,000 to 80,000 tons of fuel oil were needed in [illegible] and [illegible] tons for [illegible] making.

[illegible] in Belgium [illegible]. The [illegible] requirements of [illegible] [illegible] of [illegible] from the [illegible], [illegible] tons [illegible]. The average unit consumption of motor fuel by buses and trucks has also been estimated [illegible] below the [illegible] figure.

2. Railways. The oil requirements of the Belgian National Railways have been published by the railway company and are given in Table [illegible] on the following page.

3. Shipping. The sales of bunker oil to ships engaged in foreign trade were given in the export statistics for 1938. Information from other sources indicates that these statistics did not include all the quantities used as bunker oil. They have nevertheless been used as the most reliable source of detailed information available. (See Table [illegible])

Inland waterways, though of much less importance than in Holland, were over 1,000 miles in length. In 1937-38 inland shipping accounted for [illegible] million ton-kilometers of freight as compared with [illegible] million ton-kilometers accounted for by the railways, and [illegible] million by road vehicles. There is no other basis on which to estimate the oil requirements of inland shipping. Together with the requirements for fishing vessels, they have been roughly estimated at 7,000 tons of gas oil, 5,000 tons of fuel oil, and 500 tons of motor fuel. Inland marine lubricating oil sales amounted to 2,[illegible] tons.

4. Aviation. The consumption of aviation gasoline, estimated on the basis of the operation statistics of the Sabena Company (the Belgian commercial airlines), amounted to 5,[illegible] tons.

6. Agriculture. The only statistical basis for estimating the demand of agriculture is a survey made in 1929. At that date, 1,170 tractors, 4,315 gasoline motors, and 2,400 kerosene motors were used on Belgian farms. Trade has been excessive mechanization since that time but no detailed figures are available. According to trade sources, some 12,000 tons of kerosene were used in agriculture in 1953, and probably another 3,000 tons of motor fuel. Gas oil demand has been estimated at less than 5,000 tons.

7. Industry. Over 1,011 tons of gasoline and white spirit were used for industrial purposes in 1953. In addition, some 65,700 tons of gas oil and 40,000 tons of fuel oil were consumed. Lubricating oil demand has been estimated at over 15,000 tons.

8. Household. The demand for kerosene for household purposes was less than 80,000 tons. Requirements of fuel oil for heating have been roughly estimated at 6,000 tons.

VI. THE NETHERLANDS

Industrial and Civilian Consumption of Mineral Oil Products in the Netherlands in 1938

No official or semi-official statistics are available indicating the consumption of petroleum products in Holland in 1938. The estimate is based on import statistics, trade sources, and a report to the World Petroleum Congress in 1938.

Products	Consumption (in thousands of metric tons)
Light motor fuel	[illegible]
Kerosene	[illegible]
Lubricants	73.5
Gas oil	462.6
Fuel oil	770.0
Total consumption	[illegible]

Table 15 on the following page shows the breakdown of petroleum consumption by uses. Section B following the table shows how these estimates were reached.

Table [illegible] — [illegible], INDUSTRIAL AND CIVILIAN CONSUMPTION OF MINERAL OIL PRODUCTS BY USES IN [illegible]

(In thousands of metric tons)

Use	Liquid motor fuel	Kero-sene	Lubri-cants	Gas oil	Fuel oil	Total
Road Transportation						
Motorcycles	[illegible]	—	[illegible]	—	—	[illegible]
Private cars	[illegible]	—	[illegible]	—	—	[illegible]
Buses	[illegible]	—	[illegible]	[illegible]	—	[illegible]
Trucks	[illegible]	—	[illegible]	[illegible]	—	[illegible]
Total Road Transportation	[illegible]	—	[illegible]	[illegible]	—	[illegible]
Railways	[illegible]	—	[illegible]	[illegible]	—	[illegible]
Shipping						
Inland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Overseas	—	—	[illegible]	[illegible]	[illegible]	[illegible]
Total Shipping	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aviation	[illegible]	—	[illegible]	—	—	[illegible]
Agriculture	[illegible]	16.0	[illegible]	[illegible]	—	[illegible]
Industry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Household	—	[illegible]	—	—	—	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Use	Light motor fuel	Fuel oil	Lubricating oil	Grease	Total
Road transport (c.v.)					
Motorcycles					
Private cars					
Buses					
Trucks					
Total road transport					
Railways					
Shipping					
Stationary					
Electricity undertakings					
Gas works					
Total Shipping					
Aviation					
Agriculture					
Industry					
Household					
TOTAL					

C. Notes to Table 41

1. Road Transportation. Denmark was one of the most densely motorized countries of Europe, as shown by the registration figures:

Type of Vehicle		Number
Motorcycles		22,324
Passenger cars		106,203
Buses: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total buses		[illegible]
Trucks: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total trucks		[illegible]
Total registrations		[illegible]

A breakdown according to horsepower or carrying capacity of the various categories of vehicle is not available. Conditions, however, differed little from those in the Reich. German averages have been used for estimating gasoline requirements of motorcycles and private cars. Bus traffic was highly developed and the length of bus lines came close to 20,000 kilometers. Unit requirements for buses have been put at 85 to 90 percent of the German ones, and those of trucks at around 90 percent. The total gas oil demand for road transportation was probably less than 1,000 tons, 700 tons of which were used by buses and 300 by trucks.

2. Railways. Diesel and gasoline railcars were widely used in Denmark. In the fiscal year 1938-39, they operated over 10 million kilometers or nearly one-fourth of all locomotive-kilometers ([illegible] million). Oil requirements as given in the official railway report are shown in Table 42 on the following page.

3. Shipping. No [illegible] estimate of the oil requirements of the fishing fleet and the [illegible] shipping and ferrying services [illegible] the Danish islands. [illegible] of the 15,890 fishing vessels, [illegible] were motor [illegible]. Very tentatively the oil requirements for fishing vessels, coastal and other shipping have been put at [illegible],000 tons of gasoline, 10,000 tons of kerosene, and [illegible],000 tons of gas oil. Diesel engine lubricating oil requirements [illegible] tons.

According to Danish sources, [illegible] tons of bunker oil were used for overseas shipping, [illegible] tons of which were lubricating oils.

4. Aviation. Aviation gasoline demand, because of the [illegible] activities of commercial aviation, amounted to [illegible] tons. The actual sales of aviation gasoline in 1937, according to an American consular report, were as high as [illegible] tons. Part of these sales may have gone [illegible].

5. Agriculture. Large quantities of oil products were used by the agricultural industry. According to the census of July [illegible], some [illegible] tractors and 34,[illegible] stationary motor engines were used on farms. As most of the farms were of small size, it may be assumed that only a few tractors were Diesel-engined. Tentatively, agricultural gasoline requirements have been estimated at 5,000 tons, kerosene for stationary engines, chicken breeding, etc., at [illegible] tons, and lubricants at [illegible] tons. The number of trucks and motor vehicles used on farms was considerable, about [illegible] of all the motor vehicles having been registered in rural districts. These requirements were, however, included under those of road transportation.

2. Railways- The official railway report does not contain data on oil consumption. In 1938 motor rail cars traveled some [illegible] million kilometers. Their oil requirements may be estimated at [illegible] tons. Lubricating oil consumed, on the basis of locomotive-kilometers performed in 1938 ([illegible] million), has been put at [illegible] tons, assuming that the rate of consumption was somewhat higher than in Denmark.

3. Shipping- In 1938 some [illegible] motor ships and [illegible],000 small boats equipped with outboard motors were engaged in fishing. Some 130,000 tons of gas oil were used for the fishing fleet and for shipping along the 2,000 kilometer coastline. In addition, according to official sources, gasoline requirements for fishing vessels amounted to [illegible],000 tons and kerosene to 4,000 tons. Sales of marine lubricating oil for fishing and coastal shipping reached [illegible] tons.

Bunker oil demand for overseas shipping, according to trade sources, reached 8,400 tons of gas oil and 154,000 tons of fuel oil. Lubricating oil sales have been estimated at 4,000 tons.

4. Aviation- The consumption of aviation gasoline has been estimated on the basis of airplane kilometers flown by commercial companies in 1938 (722,000). An arbitrary 50 percent was added to take care of other civilian flying.

5. Agriculture- In 1938 2,[illegible] tractors and [illegible],608 stationary motors were used by Norwegian farmers. According to official statistics, consumption amounted to 8,000 tons of gasoline, 4,[illegible] tons of kerosene, 5,500 tons of gas oil, and 1,000 tons of lubricating oil for 1938.

III. TABLES

[illegible] Industrial and Civilian Consumption of Mineral Oil Products in [illegible]

[illegible]

[illegible]

Product	Consumption (in thousands of metric tons)
Light motor fuel	[illegible]
Kerosene	[illegible]
Lubricants	[illegible]
Gas oil	[illegible]
Fuel oil	[illegible]
Total Consumption	[illegible]

Table [illegible] on the following page shows the breakdown of petroleum consumption by [illegible]. [illegible] following, the table shows how these consumers were supplied.

INDUSTRIAL AND CIVILIAN CONSUMPTION
OF MINERAL OIL PRODUCTS BY USES IN 1960

(In thousands of metric tons)

Uses	Light motor fuel	Kero-gene	Lubri-cants	Bitu-men	Fuel oil	Total
Road transportation						
Motorcycles				—		
Private cars				—		
Buses					—	
Trucks					—	
Total Road Transp.						
Railways		—				
Navigation	—	—				
Agriculture						
Industry						
Household					—	
Total						

B. Notes to Table 26.

1. Road Transportation. Motor-vehicle registrations in 1938 were as follows:

Type of Vehicle		Number
Motorcycles		[illegible]
Private cars		2,889
Buses: Gasoline-engined	2[illegible]	
Diesel-engined	[illegible]	
Total buses		[illegible]
Trucks: Gasoline-engined	2,6[illegible]	
Diesel-engined	[illegible]	
Total trucks		2,6[illegible]
Total registrations		[illegible]

The unit demand for motorcycles and motor cars has been put at approximately 50 percent below the German rate. Bus transportation was of great domestic importance. The buses operated in 1937 over nearly 6,000 kilometers of highway; their mileage for inter-city and urban traffic amounted to 15.5 million kilometers. The unit oil consumption of buses has been put a little below the German figure to allow for the smaller average size of Latvian buses. Trucks are believed to have consumed less motor fuel per unit than in Germany.

2. Railways. Statistics covering the demand of the railroads for lubricating oil are not available; it has been estimated [illegible] tons, using the unit consumption [illegible] mileage as a basis [illegible] oil demand probably reached [illegible] tons. Over [illegible] million kilometers [illegible] were covered.

B. Notes to Table 37

1. Road Transportation. The motor vehicle registration figures for [illegible] are given below:

Type of Vehicle		Number
Motorcycles		2,085
Private cars		2,143
Buses: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total buses		[illegible]
Trucks: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total trucks		[illegible]
Total registrations		5,0[illegible]

Average oil requirements for the various categories of vehicle have been put 70 to 80 percent below the corresponding figures for Germany. The poverty of the population and the backwardness in developing the road network were responsible for the low rate of consumption of oil for transportation.

2. Railways. On the basis of a comparison between the operating statistics of the Lithuanian railways and those of the other Baltic states, the lubricating oil requirements of the railroads have been estimated at 800 tons. Over [illegible] million locomotive-kilometers were covered.

3. Shipping. Very little petroleum was used for shipping and this item has therefore been omitted from the Lithuanian estimate.

4. Aviation. The consumption of petroleum for civil aviation was negligible and has therefore not been included in this analysis.

5. Agriculture. Nearly 77 percent of the working population was employed in agriculture. No data are available on the use of agricultural machinery, except that the sale of oil products for agricultural use was considerably lower than in Ireland. The demand has been estimated at 300 tons of motor fuel, 1,000 tons of illuminating fuel and 700 tons of lubricants.

6. Industry. Some 800 tons of gasoline, 5,000 tons of motor fuel, 17,600 tons of heavy oils and 2,160 tons of other petroleum products would have been absorbed by industry.

7. Household. The requirements of petroleum for household purposes were some 40,000 tons.

[illegible]

A. Industrial and Civilian Consumption of Petroleum Products in China in 1956

The estimates of consumption of mineral oil products in [illegible] [illegible] have been based on refining statistics and on [illegible] [illegible] and [illegible]. The estimate for 1956 is as follows:

Product	Consumption (In thousands of metric tons)
Light motor fuel	[illegible]
Kerosene	[illegible]
Lubricants	[illegible]
Gas oil	[illegible]
Fuel oil	[illegible]
Total consumption	[illegible]

Table [illegible] on the following page shows the breakdown of petroleum consumption by user. Section B following the table shows how [illegible] [illegible] [illegible].

B. Motor Vehicles.

1. Road Transportation. The following figures show the registration of motor vehicles in 1938:

Type of Vehicle			Number
Motorcycles			4,875
Private cars			25,480
Buses:	Gasoline-engined	1,671	
	Diesel-engined	83	
	Total buses		1,754
Trucks:	Gasoline-engined	7,631	
	Diesel-engined	341	
	Total trucks		8,072
Total registrations			44,201

The unit consumption of motorcycles and private cars has been put somewhat below the German figure. In 1937 the daily average for 1,484 public service buses was 180,000 kilometers; they carried 78,800,000 passengers in the course of the year. The fuel consumption of buses was taken put 10 to 15 percent below the German rate. Thile, according to the Polish Transport Yearbook, the average carrying capacity of trucks was as high as 3.5 tons, their annual mileage was much lower than in Germany, due to the bad conditions of the roads. In Poland the commercial transport industry was still in the early stages of development. Truck requirements have been put some 15 percent below the German figure.

2. Railways. Figures covering the oil consumption of the railroads are not available. By the end of 1938, forty-seven Diesel railcars were in operation or on order. The gas oil demand of the railroads probably

amounted to less than 1,000 tons. Lubricating oil requirements, calculated on the basis of locomotive-kilometers (over 156 million in 1938) have been put at 6,000 tons, assuming that the demand per locomotive-kilometer was about double that of Germany.

3. Shipping. There is no information available on which to base a reliable estimate of the oil requirements for shipping on inland waterways. It is only known that in 1938, 715,000 tons of goods were transported on rivers and canals. Tentatively, the oil requirements for inland shipping were then put at 2,500 tons of gasoline, 1,000 tons of gas oil, and 500 tons of lubricants.

4. Aviation. The demand for aviation gasoline in 1938 was based on the operation activities of the commercial airlines (1,400 tons) to which 50 percent has been added to cover other civil flying.

5. Agriculture. In 1936-37, according to a report submitted to the World Power Conference in 1938, 2,200 tractors and 3,000 other oil motors were employed in agriculture. By 1950 their number has obviously increased. According to trade estimates, some 80,000 tons of kerosene were used by farmers in the latter year, but this figure certainly includes their requirements for lighting, heating, and cooking, which is included with household demand. The agricultural requirements for automotive purposes have been tentatively put at 4,000 tons of gasoline, 30,000 tons of kerosene, 5,000 tons of gas oil, and 2,000 tons of lubricants.

6. Industry. Oil consumption in the manufacturing industries has been established on the basis of a census taken in 1938 (Table 33). These figures

are, however, misleading. The largest [illegible] tons of crude [illegible] needed by oil refineries which actually include part of their [illegible] petroleum and 24,000 tons of heavy oils.

Household. In 1958, 12',000 tons of kerosene were used for [illegible]. Some fuel oil, tentatively put at 5,000 tons, was probably used for [illegible].

VIII. [illegible]

A. Industrial and Civilian Consumption of Petroleum Products in Yugoslavia in 1938.

The estimate of mineral oil consumption in Yugoslavia in 1938 is based on import and domestic refining statistics and on information from trade sources.

Products	Consumption (In thousands of tons)
Light motor fuel	[illegible]
Kerosene	[illegible]
Lubricants	[illegible]
Gas oil	[illegible]
Fuel oil	[illegible]
Total consumption	155.0

Table 40 on the following page shows the breakdown of petroleum consumption by uses. Section F following the table shows how these estimates were reached.

Table 40. [illegible] ESTIMATED AND ACTUAL CONSUMPTION OF PETROLEUM PRODUCTS BY USES IN 1954

(In thousands of metric tons)

Use	Light motor fuel	Kerosene	Lubricants	Gas oil	Fuel oil	Total
Road transportation						
Motorcycles	1.8	—	0.8	—	—	2.6
Private cars	12.6	—		—	—	24.3
Buses	9.5	—	0.5	3.5	—	13.5
Trucks	7.0	—	1.0	15.0	—	23.0
Total Road Transportation	30.9	—	2.0	18.5	—	51.4
Railways	—	—	1.3	7.5	—	8.8
Shipping	2.0	2.0	1.5	2.0	5.0	12.5
Aviation	0.5	—	0.1	—	—	0.6
Agriculture	2.0	2.5	0.3	1.9	—	6.7
Industry	7.7	5.0	14.0	3.1	32.0	61.8
Household	—	23.5	—	—	—	23.5
Total	43.7	32.0	20.0	32.0	45.0	165.0

B. [illegible]

1. Road Transportation. The number of [illegible] registered [illegible] was as follows:

Type of Vehicle		Number
Motorcycles		[illegible]
Private cars		[illegible]
Buses: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total buses		[illegible]
Trucks: Gasoline-engined	[illegible]	
Diesel-engined	[illegible]	
Total trucks		[illegible]
Total registrations		[illegible]

Though the total number of registrations in Yugoslavia was comparatively low, many Diesel-engined buses and trucks had been acquired during the years just prior to 1938. [illegible] percent of the [illegible] and a loading capacity of over [illegible] tons [illegible] of these were Diesel-engined. Motor fuel needed for motorcycles and private cars has been put [illegible] 10 to 15 percent below the German average. [illegible] requirements of buses and trucks [illegible] at around [illegible] percent [illegible]

2. Railways. According to official railway statistics [illegible] tons of lubricants were used in 1938, or [illegible] kilograms per thousand locomotive kilometers. In addition, 22 Diesel railcars used [illegible] tons of gas oil. In 1938 the total number of locomotive-kilometers was [illegible] million.

Table 11. GREECE: INDUSTRIAL AND CITY GAS CONSUMPTION OF PETROLEUM PRODUCTS BY USER IN 1965

(In thousands of metric tons)

	Light motor fuel	Heavy oil	Lubricants	Gas oil	Fuel oil	Total
Road transportation						
Motorcycles	0.2	--	0.1	--	--	0.3
Private cars	3.0	--	0.4	--	--	3.4
Buses	28.0	--	1.1	1.0	--	30.1
Trucks	26.0	--	0.9	1.0	--	27.9
Total road transportation	57.2	--	2.5	2.0	--	61.7
Railways	--	--	0.8	6.1	--	6.9
Shipping						
Inland	0.9	--	0.2	22.1	31.0	54.2
Overseas	--	--	1.0	--	37.0	38.0
Total Shipping	0.9	--	1.2	22.1	68.0	92.2
Aviation	0.3	--	0.1	--	--	0.4
Agriculture	3.3	2.0	0.5	0.2	--	6.0
Industry	1.0	0.1	n/a	24.8	225.0	250.9
Commercial	--	11.0	--	--	74.0	85.0
Total	62.7	13.1	5.1	55.2	367.0	503.1